

March 18, 1969

J. M. LEACH

3,433,349

MATERIAL HANDLING CONVEYORS

Filed May 16, 1966

Fig. 2.

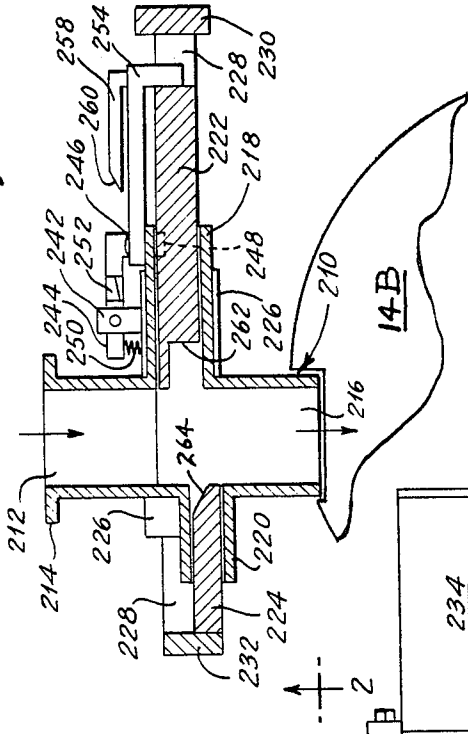


Fig. 3.

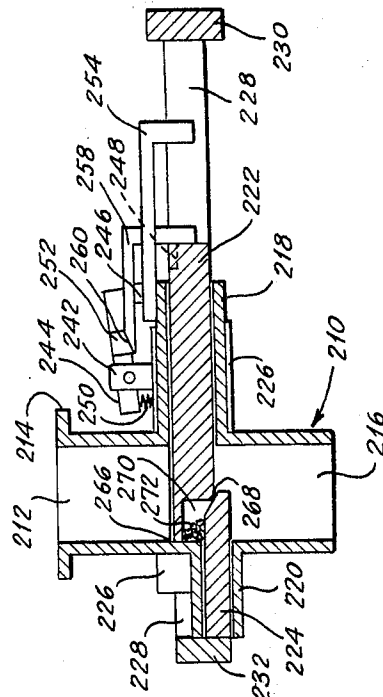
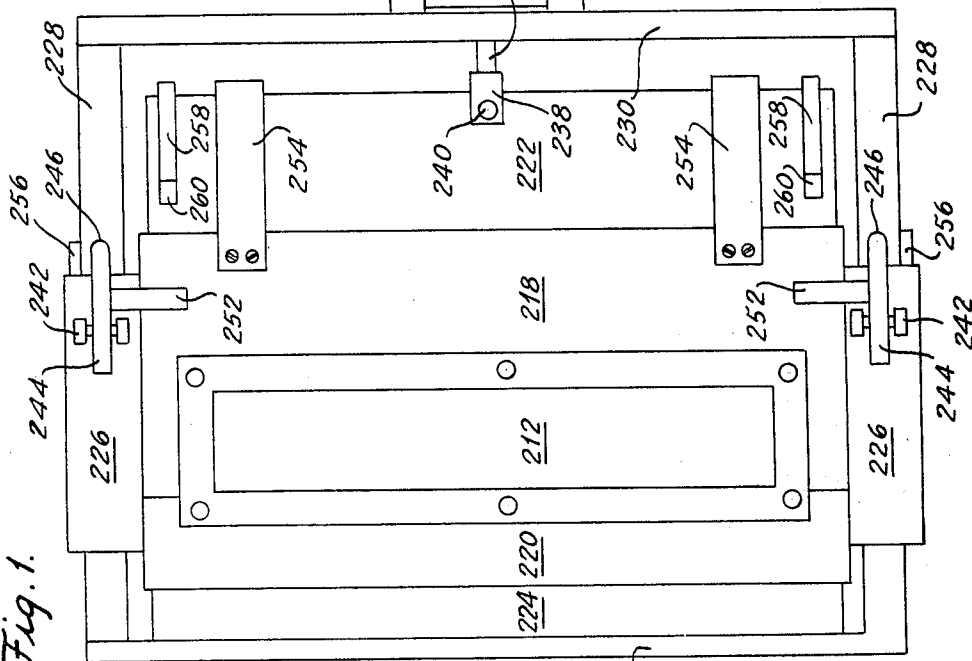


Fig. 1.



INVENTOR.

John M. Leach

1

3,433,349

MATERIAL HANDLING CONVEYORS

John M. Leach, P.O. Box 341, Port
Jefferson, N.Y. 11777

Filed May 16, 1966, Ser. No. 550,558

U.S. Cl. 198-177

Int. Cl. F16k 3/14

8 Claims

ABSTRACT OF THE DISCLOSURE

A dribble-free gate valve for use in a closed conveyor system which utilizes a chamber between the gate members to retain any leakage of material upon closing of the valve.

The present invention relates to conveyors. More particularly, it relates to conveyors for carrying bulk and semi-liquid materials which can not be effectively pumped in a practical manner.

It is an object of the present invention to provide a completely closed conveyor which will carry any material which can be poured from one level to another, in absolute isolation, in any direction, without exerting any frictional forces upon the material, without exerting any extraneous force upon the material, without degrading the particles of the material, and without classifying the particles of the material.

It is a further object of the present invention to provide a dribble-free gate which makes it possible to feed materials into the conveyor without spillage of the materials.

In the drawings:

FIG. 1 is a plan view of the flow control dribble-free gate of the present invention;

FIG. 2 is a cross sectional view taken substantially on the plane indicated by line 2—2 of FIG. 1 and looking in the direction of the arrows, and showing the dribble-free gate in the open position; and

FIG. 3 is a view similar to FIG. 2 but showing the dribble-free gate in the closed position.

The supporting conveyor and the outlet opening and the two closures for the openings of the material holding magazines have been omitted from the drawings in order to more clearly show other elements of the present invention, but it is to be understood that the omitted parts will be used as described in the earlier invention. The dribble-free gate comprises a body 210 having an inlet opening 212 provided with a bolting flange 214 and an outlet opening 216. The two openings 212 and 216 form a throughway in the body.

Two slideways 218 and 220 are provided in the body 210 on opposite sides of the throughway. A plate 222 is slidable backward and forward in the guideway 218 and is provided with a notched-out area 262 as shown in FIG. 2 which forms a chamber 270 as shown in FIG. 3 when the gate is closed. A second plate 224 is slidably positioned in the slideway 220. The plate 222 is sufficiently stiff to support itself without sagging when it is in the closed position. The two plates 222 and 224 can be formed of any desired material but are preferably formed of a suitable relatively light plastic, such as nylon, which also increases the wear resistance.

A slide guide 226 is suitably attached to each end of the body 210 and each supports a slide 228 which is suitably attached at one end to a cross piece 230 and at the opposite end to a cross piece 232 which is suitably directly connected to the gate 224. The cross piece 230 carries a suitable force exerting mechanism such as a conventional double acting air cylinder 234 which has a rod 236 connected to a clevis 238 which is pivotally connected as at 240 to the gate 222. The air cylinder 234 is con-

2

nected to any desired source of air pressure by means of hose and a conventional control valve (not shown).

Each of the guides 226 carries a fulcrum 242 which pivotally supports an arm 244 provided with a detent 246 on one end which when the gate is open is held in a depression 248 formed in each slide 228 by a spring 250 positioned between an end of the arm 244 and the guide 226. Each of the arms 244 is provided with an extension 252 which extends inwardly towards the center of the gate.

Two stops 254 suitably attached to the guideway 218 limit the movement of the plate 222 out of the guideway 218, and stops 256 carried by the slides 228 contact the ends of the guides 226 and limit the movement of the gate 224 out of the guideway 220.

Two cam members 258 provided with camming surfaces 260 are carried for movement with the gate 222.

It will be noted that no projections exist in the through way when the gate is open to impede the flow of material.

When it is desired to close the gate, air under pressure is suitably introduced into the outermost end of the cylinder 234 which will drive the rod 236 out of the cylinder and move plate 222 into the throughway. Plate 224 can not move at this time because slides 228 are locked from movement by the detents 246 which are seated in the depressions 248. The movement of plate 222 will be stopped when it contacts the side of the throughway, or entraps any material between its leading edge and the side of the throughway. At this time the gate will be closed or as nearly closed as the entrapped material will permit which means that a small slit-like opening still exists through which material can dribble.

Slightly before the plate 222 strikes the side of the throughway in the vicinity of the point 266, the camming surfaces 260 will strike the arms extensions 252 and rock the arms so as to withdraw the detents 246 from the depressions 248 and release the slides 228 so that the continuing force exerted by the cylinder 234 after the plate 222 is stopped will move the slides 228, the cross piece 232 and the plate 224 in a direction opposite to that in which the plate 222 moved. The plate 224 will continue to move until its bevelled leading edge 264 strikes the other plate 222 as shown at 268 which tends to force the gate 222 upwardly and thus form tight seals between the two plates as well as between the gates and the body 210.

Whenever any material in entrapped between the leading edge of the plate 222 and the throughway, which will be almost every closing, all material which dribbles through the slit-like opening will be caught by the plate 222 as it passes rapidly under the opening and will be retained within the chamber 270 formed by the notched out area 262 of the plate 222 and the top of the plate 224 as shown at 272. This retained material will be retained within the chamber 270 until the gate is again opened at which time it will be dumped out as the plates move apart and be carried along with the flow of the material.

When it is desired to open the gate, air is suitably switched to the innermost end of the cylinder 234 which will move the rod 236 inwardly of the cylinder and move both of the plates 222 and 224 out of the throughway either at the same time or one after the other and it does not matter which occurs because in either event the plate 222 will be stopped by the stops 254 and the plate 224 will be stopped by the stops 256 and the detents 246 will re-enter the depressions 248 and thus permit material to flow freely through the throughway until the gate is again closed.

It will be seen that the present invention provides a gate which is entirely free from dribble when closed no matter what variable sizes of particles may exist in the material passing through the gate which will prevent any material

from falling in the spaces between the material holding magazines 14B or in any other place where it is not supposed to fall. In addition, this important result is accomplished with a structure which is activated by a single linear motion of the force exerting means.

It is to be understood that a simple hand operated lever and linkage can be substituted for the air cylinder where such is desired. The lever would be fulcrumed on the cross-piece 230 and connected to the plate 222 by a simple linkage.

The dribble-free gate of the present invention is capable of controlling the flow of material into a receiver regardless of its shape and position and has therefore been shown in the vertical position, but when feeding into a conveyor supported magazine such as 14B, the gate will usually be rotated so as to feed into a receiving opening located sufficiently to one side of the vertical to enable the magazine to be suitably carried by the conveyor.

It is to be understood that the foregoing description is descriptive and not limitative because many changes and modifications can be made in the physical structure without departing from the spirit of the invention.

The invention having been described, what is claimed is:

1. A material handling system comprising a material holding magazine provided with a material receiving opening, means for supporting said magazine for movement, means for supplying material to be conveyed through said opening including a control gate comprising a body having a throughway and a slideway running transversely of said throughway, a rigid plate slidably disposed in said slideway, means for moving said plate into said throughway and towards its opposite side to obstruct flow of material through the throughway, said body having a second slideway running transversely of said throughway and located below the level of and diametrically across said throughway from said first mentioned slideway, a plate slidably disposed in said last mentioned slideway, means for moving said last mentioned plate after movement of said first mentioned plate and in an opposite direction into contact with a lower portion of said first mentioned plate so that said last mentioned plate receives and discontinues any and all flow of material through any opening between said first mentioned plate and the said side of the throughway caused by the entrapment of material between said first mentioned plate and the said side of the throughway.

2. A material flow control gate comprising a body having a throughway and a slideway running transversely of said throughway, a rigid plate slidably disposed in said slideway, means for moving said plate into said throughway and towards its opposite side to obstruct flow of material through the throughway, said body having a second slideway running transversely of said throughway and located below the level of and diametrically across said throughway from said first mentioned slideway, a plate slidably disposed in said last mentioned slideway, means for moving said last mentioned plate after movement of said first mentioned plate and in an opposite direction into contact with a lower portion of said first mentioned plate so that said last mentioned plate receives and discontinues any and all flow of material

through any opening between said first mentioned plate and the said side of the throughway caused by the entrapment of material between said first mentioned plate and the said side of the throughway.

3. A material flow gate as specified in claim 2 further characterized in that the area of the plate which is moved into contact with the other plate is bevelled so that a wedging force is created to hold the two plates in tight contact.

4. A material flow gate as specified in claim 2 in which the leading edge of the first mentioned plate is notched out to form a chamber with the second mentioned plate when the two are in contact and thus form a chamber which retains all material intercepted by the second mentioned plate.

5. A material flow control gate comprising a body having a throughway and a slideway running transversely of said throughway, a rigid plate slidably disposed in said slideway for movement in opposite directions, said body having a second slideway running transversely of said throughway and located below the level of an diametrically across said throughway from said first mentioned slideway, a plate slidably disposed in said last mentioned throughway for movement in opposite directions, a number carried by said second mentioned plate and extending transversely of said throughway into the vicinity of said first mentioned plate, and force exerting means carried bodily between said first mentioned plate and said member to impart lineal movement to each in opposite directions to move said plates into or out of said throughway.

6. A material flow control gate as specified in claim 5 in which the force exerting means comprises an air cylinder.

7. A material flow control gate as specified in claim 5 in which the force exerting means includes means for preventing movement of said second mentioned plate into said throughway until movement of said first mentioned plate into said throughway is substantially completed.

8. A material flow control gate as specified in claim 5 in which the second mentioned plate at the end of its movement into said throughway forcibly contacts said first mentioned plate.

References Cited

UNITED STATES PATENTS

333,585	1/1886	Barnard	198—53
675,657	6/1901	Hoshor	198—63
941,442	11/1909	Dornfeld	251—203 XR
2,800,106	7/1957	Nelson	198—177 XR
2,810,394	10/1957	Ferguson	251—212 XR
3,015,342	1/1962	Price	137—493.6 XR
3,182,954	5/1965	Borger	251—204 XR
3,215,393	11/1965	Allen	251—1
3,224,382	12/1965	Floehr	251—204 XR

HAROLD W. WEAKLEY, *Primary Examiner.*

U.S. Cl. X.R.

251—62, 203, 328, 333

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,433,349

March 18, 1969

John M. Leach

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, lines 24 and 25, "number" should read -- member --.

Signed and sealed this 31st day of March 1970.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

WILLIAM E. SCHUYLER, JR.

Commissioner of Patents